

CLAIMS

1. A valve timing adjusting device comprising:

a first rotor that integrally fixes: a housing having the bearing of a camshaft; a case internally having a plurality of shoes projecting therefrom and having hydraulic chambers formed between the shoes; and a cover covering the hydraulic chambers, and that rotates integrally with a crankshaft;

a second rotor that has a plurality of vanes each dividing the hydraulic chamber into an advanced-angle hydraulic chamber and a retarded-angle hydraulic chamber, can relatively rotate through a predetermined angle within the first rotor, and is integrally fixed with an intake or exhaust camshaft;

a hydraulic pressure supplying-and-discharging means that can supply hydraulic operating fluid to and discharge the fluid from the advanced-angle hydraulic chamber and the retarded-angle hydraulic chamber;

an engaging cavity provided in one of the first rotor and the second rotor; and

a lock pin that is housed in a housing hole provided in the other of the first rotor and the second rotor, and that is projected therefrom by the energizing force of an energizing means when the hydraulic pressure applied by the hydraulic pressure supplying-and-discharging means is reduced, thereby abutting on the wall of the engaging cavity from an oblique direction to give a relative rotating force to the first rotor and the second rotor.

2. A valve timing adjusting device according to Claim 1, wherein the housing hole of the lock pin is formed in the face of the vane of the second rotor that is opposite to the housing of the first rotor at an angle to the rotation axis.

3. A valve timing adjusting device according to Claim 1, wherein the housing hole of the lock pin is formed in the inner peripheral surface of the shoe of the first rotor that is opposite to the outer peripheral surface of the second rotor at an angle with the radial direction.

4. A valve timing adjusting device according to Claim 3, wherein a work-guide surface intersected by the axis of the housing hole is provided in the surface in which the housing hole is to be machined, in the inner peripheral surface of the shoe of the first rotor opposite to the outer peripheral surface of the second rotor.

5. A valve timing adjusting device according to Claim 1, wherein the tip of the lock pin abutting on the wall of the engaging cavity from an oblique direction is tapered such that the tip thereof is parallel to the wall of the engaging cavity.

6. A valve timing adjusting device according to Claim 1, wherein the engaging cavity is given the shape of a groove.

7. A valve timing adjusting device according to Claim 1, wherein the engaging cavity the wall of which abuts on the tip of the lock pin traveling parallel to the rotation axis from an oblique direction is created.